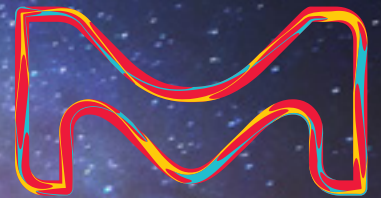


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## Aerobic Glycolysis and the Warburg Effect

The Warburg effect is the enhanced conversion of glucose to lactate observed in tumor cells, even in the presence of normal levels of oxygen. Converting glucose to lactate, rather than metabolizing it through oxidative phosphorylation in the mitochondria, is far less efficient as less ATP is generated per unit of glucose metabolized. A high rate of glucose uptake is required to meet increased energy needs to support rapid tumor progression. Aerobic glycolysis supports

various biosynthetic pathways and, consequently, the metabolic requirements for proliferation. The PI3K pathway is considered to be a major determinant of the glycolytic phenotype through AKT1 and mTOR signaling, and subsequent downstream Hypoxia Inducible Factor 1 (HIF-1) transcription factor activation. Inhibitors of the glycolytic pathway, such as dichloroacetic acid (DCA) and 2-deoxy-d-glucose (2DG) are now being used in clinical studies as potential anticancer agents.

### Kits for Studying Aerobic Glycolysis Metabolites and Metabolic Enzyme

Cat. No.	Name	Description
MAK039	Acetyl-Coenzyme A Assay Kit	Sufficient for 100 fluorometric tests
MAK133	ADP Assay Kit	Sufficient for 100 luminescent assays
MAK518	ADP Assay Kit	Sufficient for 100 fluorometric tests
MAK135	ADP/ATP Ratio Assay Kit	Sufficient for 100 luminescent assays
MAK190	ATP Colorimetric/Fluorometric Assay Kit	Sufficient for 100 colorimetric or fluorometric assays
MAK020	Fructose-6-Phosphate Assay Kit	Sufficient for 100 fluorometric tests
MAK015	G6PDH Activity Assay Kit	Sufficient for 100 colorimetric tests
GAGO20	Glucose (GO) Assay Kit	Sufficient for 20 tests
GAHK20	Glucose (HK) Assay Kit	Sufficient for 20 tests
MAK083	Glucose Uptake Colorimetric Assay Kit	Sufficient for 100 colorimetric tests
MAK084	Glucose Uptake Assay Kit	Sufficient for 100 fluorometric tests
MAK098	Glucose-1-Phosphate (G1P) Colorimetric Assay Kit	Sufficient for 100 colorimetric tests
MAK014	Glucose-6-Phosphate Assay Kit	Sufficient for 100 colorimetric tests
MAK021	Glucose-6-Phosphate Assay Kit	Sufficient for 100 fluorometric tests
MAK091	Hexokinase Colorimetric Assay Kit	Sufficient for 100 colorimetric tests
MAK265	Fructose Colorimetric/Fluorometric Assay Kit	sufficient for 100 colorimetric or fluorometric tests
MAK181	High Sensitivity Glucose Assay Kit	Sufficient for 100 fluorometric assays
MAK064	Lactate Assay Kit	Sufficient for 100 colorimetric or fluorometric tests
MAK065	Lactate Assay Kit II	Sufficient for 100 colorimetric tests
MAK066	Lactate Dehydrogenase Activity Assay Kit	Sufficient for 500 colorimetric tests
MAK017	Lactose Assay Kit	Sufficient for 100 colorimetric or fluorometric tests
MAK511	Malate Assay Kit	Sufficient for 100 colorimetric tests
MAK037	NAD/NADH Quantitation Kit	Sufficient for 100 colorimetric tests
MAK102	PEP Colorimetric/Fluorometric Assay Kit	Sufficient for 100 colorimetric or fluorometric tests
MAK093	Phosphofruktokinase (PFK) Activity Colorimetric Assay Kit	Sufficient for 100 colorimetric tests
MAK071	Pyruvate Assay Kit	Sufficient for 100 colorimetric or fluorometric tests
MAK072	Pyruvate Kinase Activity Assay Kit	Sufficient for 100 colorimetric or fluorometric tests
PP0520	GlycoProfile™ 2-AB Labeling Kit	Sufficient reagents for labeling up to 36 samples
G4548	GlycoProfile™ Glycan Clean-Up Cartridge	For use with the GlycoProfile™ 2-AB Labeling Kits
PP0510	GlycoProfile™ IV Chemical Deglycosylation Kit	Sufficient reagents for 10 reactions
PP0540	GlycoProfile™ β-Elimination Kit	Sufficient for 24 samples
PP0201	Glycoprofile™ II, Enzymatic In-Solution N-Deglycosylation Kit	Sufficient for 20 samples
PP0200	GlycoProfile™ I, In-Gel Deglycosylation Kit	Sufficient reagents for 10 reactions

## Metabolites, Inhibitors and Activators of Aerobic Glycolysis

Cat. No.	Name	Description
D5764	2,3-Diphospho-D-glyceric acid pentasodium salt glycolysis metabolite	Metabolite
G7528	D-(+)-Glucose BioXtra, ≥99.5% (GC)	Metabolite
G5146	D-(+)-Glucose Hybri-Max™, powder, BioReagent, suitable for hybridoma	Metabolite
P8877	D-(-)-3-Phosphoglyceric acid disodium salt ≥93%, powder	Metabolite
02711	Hydroxypyruvic acid phosphate lithium salt	Metabolite
54913	Lithium β-hydroxypyruvate hydrate ≥97.0%	Metabolite
F6803	D-Fructose 1,6-bisphosphate trisodium salt hydrate ≥98% (TLC)	Metabolite
F3627	D-Fructose 6-phosphate disodium salt hydrate ≥98%, amorphous powder	Metabolite
G7879	D-Glucose 6-phosphate sodium salt Sigma Grade, crystalline	Metabolite
79470	D-2-Phosphoglyceric acid sodium salt hydrate	Metabolite
19710	L-2-Phosphoglyceric acid disodium salt hydrate	Metabolite
D7137	Dihydroxyacetone phosphate dilithium salt	Metabolite
G5251	D,L-Glyceraldehyde 3-phosphate solution 45–55 mg/mL in H <sub>2</sub> O	Metabolite
39705	D-Glyceraldehyde 3-phosphate solution 8–13 mg/mL in H <sub>2</sub> O	Metabolite
69312	L-Glyceraldehyde-3-phosphate solution 8–12 mg/mL in H <sub>2</sub> O	Metabolite
P7127	Phospho(enol)pyruvic acid monopotassium salt ≥97% (enzymatic)	Metabolite
P7002	Phospho(enol)pyruvic acid trisodium salt hydrate ≥97% (enzymatic)	Metabolite
L7022	Sodium L-lactate ~98%	Metabolite
P5280	Sodium pyruvate powder, BioReagent, suitable for cell culture, suitable for insect cell culture, ≥99%	Metabolite
61786	D-Glyceric acid sodium salt ≥95.0% (TLC)	Metabolite
51738	L-Glyceric acid sodium salt ≥95.0% (TLC)	Metabolite
G7000	α-d-Glucose 1-phosphate disodium salt hydrate 97%, powder	Metabolite
72764	2-Phosphoglycolic acid lithium salt ≥95.0% (HPLC)	Metabolite
94124	sn-Glycerol 3-phosphate lithium salt ≥95.0% (TLC)	Metabolite
105198	(+)-Dehydroabietylamine technical grade, 60%	Pyruvate Dehydrogenase Kinase (PDK) Inhibitor
G8761	(±)-Gossypol from cotton seeds ≥95% (HPLC)	Lactate Dehydrogenase Inhibitor
D150959	1,1-Dimethylbiguanide hydrochloride 97%	Inhibitors and Activators of the AMPK pathway
D8375	2-Deoxy-d-glucose ≥98% (GC), crystalline	Hexokinase Inhibitor
A9978	AICAR ≥98% (HPLC), powder	Inhibitors and Activators of the AMPK pathway
C9623	Chetomin from Chaetomium cochliodes, ≥98% (HPLC)	HIF1 inhibitors and activator
D9533	Deferoxamine mesylate salt powder, ≥92.5% (TLC)	HIF Prolyl-Hydroxylase Inhibitor
D54702	Dichloroacetic acid ReagentPlus®, ≥99%	Pyruvate Dehydrogenase Kinase (PDK) Inhibitor
D3695	DMOG ≥98% (HPLC)	HIF Prolyl-Hydroxylase Inhibitor
P5499	Dorsomorphin ≥98% (HPLC)	Inhibitors and Activators of the AMPK pathway
F5557	Fasentin ≥98% (HPLC)	Glucose uptake, GluT1 Inhibitor
F8807	FM19G11 ≥98% (HPLC)	HIF1 inhibitors and activator
M0253	L-Mimosine from Koa hoale seeds ≥98%	HIF Prolyl-Hydroxylase Inhibitor
L4900	Lonidamine mitochondrial hexokinase inhibitor	Hexokinase Inhibitor
P7045	Phenformin hydrochloride	Inhibitors and Activators of the AMPK pathway
348082	Potassium dichloroacetate 98%	Pyruvate Dehydrogenase Kinase (PDK) Inhibitor
E24859	Protocatechuic acid ethyl ester 97%	HIF Prolyl-Hydroxylase Inhibitor
M5324	PX 12 ≥98% (HPLC), powder	HIF1 inhibitors and activator
347795	Sodium dichloroacetate 98%	Pyruvate Dehydrogenase Kinase (PDK) Inhibitor
O2751	Sodium oxamate ≥98%	Lactate Dehydrogenase Inhibitor
C2020	α-Cyano-4-hydroxycinnamic acid ≥98% (TLC), powder	Inhibitor of monocarboxylic acid transport, including lactate and pyruvate transport.

## Proteins Involved in Aerobic Glycolysis

Cat. No.	Name	Description
G6019	Glyceraldehyde-3-phosphate Dehydrogenase from human erythrocytes	lyophilized powder, 50–150 units/mg protein
L2625	L-Lactic Dehydrogenase from bovine heart Type III	ammonium sulfate suspension, ≥500 units/mg protein
L1006	L-Lactic Dehydrogenase from bovine heart Type XVII	buffered aqueous glycerol solution, ≥400 units/mg protein
L1378	L-Lactic Dehydrogenase from bovine muscle Type X	ammonium sulfate suspension, ≥600 units/mg protein
SRP5247	PDHK1, active, GST tagged human	PRECISIO® Kinase, recombinant, expressed in baculovirus infected Sf9 cells, ≥70% (SDS-PAGE), buffered aqueous glycerol solution
SRP5248	PDHK2, active, GST tagged human	PRECISIO® Kinase, recombinant, expressed in baculovirus infected Sf9 cells, ≥70% (SDS-PAGE), buffered aqueous glycerol solution
SRP5249	PDHK3, active, GST tagged human	PRECISIO® Kinase, recombinant, expressed in baculovirus infected Sf9 cells, ≥70% (SDS-PAGE), buffered aqueous glycerol solution
SRP5250	PDHK4, active, GST tagged human	PRECISIO® Kinase, recombinant, expressed in baculovirus infected Sf9 cells, ≥70% (SDS-PAGE), buffered aqueous glycerol solution
SAE0021	Pyruvate kinase M2 Active human	Recombinant, expressed in <i>E. Coli</i> , specific activity ≥100 unit/mg protein

## Gene Editing Tools for Studying Aerobic Glycolysis

Cat. No.	Name
EHU146741	MISSION® esiRNA esiRNA human GAPDH (esiRNA1)
EHU078901	MISSION® esiRNA esiRNA human GPI (esiRNA1)
EHU108531	MISSION® esiRNA esiRNA human LDHA (esiRNA1)
EHU058871	MISSION® esiRNA esiRNA human PFKL (esiRNA1)
EHU084261	MISSION® esiRNA esiRNA human PFKM (esiRNA1)
EHU147791	MISSION® esiRNA esiRNA human PGAM1 (esiRNA1)
EHU150851	MISSION® esiRNA esiRNA human PGAM2 (esiRNA1)

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## Antibodies Against Glycolytic Proteins

Cat. No.	Name	Description
G9545	Anti-GAPDH antibody produced in rabbit ~1 mg/mL, affinity isolated antibody, buffered aqueous solution	
HPA024305	Anti-GPI antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA028587	Anti-HK2 antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
SAB2108638	Anti-LDHA antibody produced in rabbit	affinity isolated antibody, buffered aqueous solution
AV45774	Anti-PFKL antibody produced in rabbit	IgG fraction of antiserum, buffered aqueous solution
HPA002117	Anti-PFKM antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA042528	Anti-PGAM1 antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
AV48138	Anti-PGAM2 antibody produced in rabbit	Affinity isolated antibody, lyophilized powder
SAB2108048	Anti-PGK1 antibody produced in rabbit	IgG fraction of antiserum, buffered aqueous solution
HPA029501	Anti-PKM antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
SAB4200105	Anti-PKM2 (C-terminal) antibody produced in rabbit	~1.5 mg/mL, affinity isolated antibody
SAB4200095	Anti-PKM2 (isoform M2) antibody produced in rabbit	~1.5 mg/mL, affinity isolated antibody
PLA0125	Rabbit anti-GAPDH Antibody	Affinity Purified Powered by Bethyl Laboratories, Inc.



## FATTY ACID METABOLISM IN CANCER

Proliferatively active cells require fatty acids for functions such as membrane generation, protein modification, and bioenergetic requirements. These fatty acids are derived either from dietary sources or are synthesized by the cell. While most non-transformed cells rely on dietary-derived fatty acids to meet their biosynthetic and bioenergetic needs, many cancer cells exhibit a lipogenic phenotype with the upregulation of many of the proteins involved in

de novo fatty acid synthesis. In particular, overexpression of the multi-enzyme complex fatty acid synthase (FASN) is common to many tumor cells and is often associated with poor prognosis. In addition to increased FASN activity, oncogenic progression is often associated with the increased activity and expression of many enzymes involved in fatty acid synthesis such as acetyl-CoA carboxylase (ACC) and ATP citrate lyase (ACL).

### Kits for Studying Fatty Acid Metabolism

Cat. No.	Name	Description
MAK086	Acetate Colorimetric Assay Kit	Sufficient for 100 colorimetric tests
MAK199	Acetoacetate Colorimetric Assay Kit	Sufficient for 100 colorimetric assays
MAK039	Acetyl-Coenzyme A Assay Kit	Sufficient for 100 fluorometric tests
MAK034	Coenzyme A Assay Kit	Sufficient for 100 colorimetric or fluorometric tests
MAK174	Fatty Acid Extraction Kit	Sufficient for 40 assays
MAK156	Fatty Acid Uptake Kit	Sufficient for 100 fluorometric assays
MAK044	Free Fatty Acid Quantitation Kit	Sufficient for 100 colorimetric or fluorometric tests
FG0100	Free Glycerol Determination Kit	Sufficient for 1000 tests
MAK117	Glycerol Assay Kit	Sufficient for 200 colorimetric or fluorometric tests
MAK134	Ketone Body Assay Kit	Sufficient for 100 assays (uv)
MAK063	L-Carnitine Assay Kit	Sufficient for 100 colorimetric or fluorometric tests
MAK046	Lipase Activity Assay Kit	Sufficient for 100 colorimetric tests with glycerol standard
MAK482	Lipase Activity Assay Kit II	Sufficient for 100 colorimetric tests with tnb standard
MAK085	Lipid Peroxidation (MDA) Assay Kit	Sufficient for 100 colorimetric or fluorometric tests
MAK049	Phosphatidylcholine Assay Kit	Sufficient for 100 colorimetric or fluorometric tests
MAK041	$\beta$ -Hydroxybutyrate Assay Kit	Sufficient for 100 colorimetric tests

### Metabolites, Inhibitors and Activators of Fatty Acid Biosynthesis Pathways

Cat. No.	Name	Description
A2056	Acetyl coenzyme A sodium salt $\geq 93\%$ (HPLC), powder	Metabolite
K2010	$\alpha$ -Ketoglutaric acid sodium salt BioUltra	Metabolite
O4126	Oxaloacetic acid $\geq 97\%$	Metabolite
71402	Sodium citrate tribasic dihydrate BioXtra, for molecular biology	Metabolite
48488	Sodium ( $\pm$ )-homocitrate tribasic $\geq 90\%$ (HPCE)	Metabolite
59464	Trisodium (2RS,3RS)-2-methylcitrate	Metabolite
76455	(R)-Sodium 2,3-dihydroxyisovalerate hydrate $\geq 95.0\%$ (CE)	Metabolite
M4263	Malonyl coenzyme A lithium salt $\geq 90\%$ (HPLC)	Metabolite
H6042	n-Heptanoyl coenzyme A lithium salt $\geq 95\%$ (HPLC)	Metabolite
N7505	$\beta$ -Nicotinamide adenine dinucleotide 2'-phosphate reduced tetrasodium salt hydrate $\geq 97\%$ (HPLC)	Metabolite
F1506	Sodium fumarate dibasic $\geq 99\%$	Metabolite
P9767	Sodium palmitate $\geq 98.5\%$	Metabolite
P5280	Sodium pyruvate powder, BioReagent, suitable for cell culture, suitable for insect cell culture, $\geq 99\%$	Metabolite
S9637	Sodium succinate dibasic hexahydrate, BioReagent	Metabolite
75447	2-Oxoadipic acid $\geq 95.0\%$ (HPLC)	Metabolite
11161	Sodium (R)- $\beta$ -hydroxyisobutyrate $\geq 96.0\%$	Metabolite
36105	( $\pm$ )-Sodium $\beta$ -hydroxyisobutyrate $\geq 96.0\%$	Metabolite
16842	Sodium (S)- $\beta$ -hydroxyisobutyrate $\geq 96.0\%$	Metabolite
C1251	(+)-Catechin hydrate $\geq 98\%$ (HPLC), powder	Fatty Acid Synthase (FAS) Inhibitors
T4512	( $\pm$ )-Taxifolin hydrate $\geq 90\%$ (HPLC)	Fatty Acid Synthase (FAS) Inhibitors
E4143	(-)-Epigallocatechin gallate $\geq 95\%$	Fatty Acid Synthase (FAS) Inhibitors

Cat. No.	Name	Description
SMB00702	Apigenin ≥97% (TLC), from citrus	Fatty Acid Synthase (FAS) Inhibitors
C5490	C75 ≥98% (HPLC), powder	Fatty Acid Synthase (FAS) Inhibitors
C2389	Cerulenin ≥98% (HPLC), from <i>Cephalosporium caerulens</i>	Fatty Acid Synthase (FAS) Inhibitors
G5547	GSK837149A ≥98% (HPLC), solid	Fatty Acid Synthase (FAS) Inhibitors
72779	Irgasan ≥97.0% (HPLC)	Fatty Acid Synthase (FAS) Inhibitors
J3455	JZL 184 hydrate ≥98% (HPLC)	Monoacylglycerol Lipase Inhibitors
K0133	Kaempferol ≥90% (HPLC), powder	Fatty Acid Synthase (FAS) Inhibitors
L9283	Luteolin ≥98% (TLC), powder	Fatty Acid Synthase (FAS) Inhibitors
M5693	MEDICA 16 powder, ≥97% (HPLC)	ATP-Citrate Lyase Inhibitors
O4139	Orlistat	Lipase inhibitor
O9265	Osthole	Fatty Acid Synthase (FAS) Inhibitors
P5585	Palmitic acid BioXtra, ≥99%	Acetyl-CoA Carboxylase Inhibitors
Q4951	Quercetin ≥95% (HPLC), solid	Fatty Acid Synthase (FAS) Inhibitors
T6575	TOFA ≥98% (HPLC)	Acetyl-CoA Carboxylase Inhibitors

### Proteins Involved in Fatty Acid Metabolism

Cat. No.	Name	Description
A6861	Acetyl-CoA carboxylase 2 human	Recombinant, expressed in Sf9 cells
A6986	Acetyl-CoA Carboxylase 1 human	Recombinant, expressed in Sf9 cells
SRP0288	ATP Citrate Lyase Active human	Recombinant, expressed in baculovirus, ≥90% (sds-page)
I2411	Isocitrate Dehydrogenase 1 (NADP+) human	Recombinant, expressed in Sf9 cells, ≥90% (sds-page) SRP5238 PDHA1 (30-390), His tagged human Recombinant, expressed in <i>E. Coli</i> , ≥70% (sds-page), buffered aqueous glycerol solution

### Gene Editing Tools for Studying Fatty Acid Metabolism

Cat. No.	Name
EHU092651	MISSION® esiRNA esiRNA human ACACA (esiRNA1)
EHU096511	MISSION® esiRNA esiRNA human ACACA (esiRNA2)
EHU081921	MISSION® esiRNA esiRNA human ACLY (esiRNA1)
EHU130711	MISSION® esiRNA esiRNA human FASN (esiRNA1)
EHU110401	MISSION® esiRNA esiRNA human IDH1 (esiRNA1)
EHU040691	MISSION® esiRNA esiRNA human MGLL (esiRNA1)
EHU142981	MISSION® esiRNA esiRNA human PDHA1 (esiRNA1)
EHU046851	MISSION® esiRNA esiRNA human PDHB (esiRNA1)
EHU041971	MISSION® esiRNA esiRNA human PDHX (esiRNA1)

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### Antibodies Against Proteins Involved in Fatty Acid Metabolism

Cat. No.	Name	Description
HPA028758	Anti-ACLY antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA006461	Anti-FASN antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA011994	Anti-MGLL antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
SAB1409429	Anti-PDHA1 antibody produced in mouse	Purified immunoglobulin, buffered aqueous solution
HPA036744	Anti-PDHB antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
SAB4503851	Anti-phospho-ACC1 (pSer <sup>80</sup> ) antibody produced in rabbit	~1 mg/mL, affinity isolated antibody, buffered aqueous solution
HPA011994	Anti-MGLL antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution

## Glutamine Metabolism in Cancer

Glutamine is used by the cell for both bioenergetic and biosynthetic needs. Glutamine can be used as an amino acid for protein synthesis, as a carbon source, or as the primary nitrogen donor for multiple essential biosynthetic reactions in the cell. Once taken up by the cell, much of the glutamine is converted to glutamate by mitochondrial glutaminase, an enzyme whose levels

are often upregulated in tumors and tumor lines. It is now well appreciated that many of the signaling pathways that promote oncogenesis also reprogram glutamine metabolism, and in many cells the dependence on glutamine is absolute, a condition termed glutamine addiction.

### Kits for Studying Glutamine Metabolism

Cat. No.	Name	Description
MAK039	Acetyl-Coenzyme A Assay Kit	Sufficient for 100 fluorometric assays
MAK001	Alanine Assay Kit	Sufficient for 100 colorimetric or fluorometric assays
MAK054	Alpha-Ketoglutarate Assay Kit	Sufficient for 100 colorimetric or fluorometric assays
AA0100	Ammonia Assay Kit	—
MAK034	Coenzyme A Assay Kit	Sufficient for 100 colorimetric or fluorometric assays
MAK060	Fumarate Assay Kit	Sufficient for 100 colorimetric assays
MAK004	Glutamate Assay Kit	Sufficient for 100 colorimetric or fluorometric assays
MAK099	Glutamate Dehydrogenase (GDH) Activity Assay Kit	Sufficient for 100 colorimetric assays
GLN1	Glutamine and Glutamate Determination Kit	—
MAK524	Isocitrate Assay Kit	Sufficient for 100 colorimetric assays
MAK037	NAD/NADH Quantitation Kit	Sufficient for 100 colorimetric assays
MAK070	Oxaloacetate Assay Kit	Sufficient for 100 colorimetric or fluorometric assays

### Metabolites, Inhibitors and Activators of Glutamine Metabolism

Cat. No.	Name	Description
A2056	Acetyl coenzyme A sodium salt $\geq 93\%$ (HPLC), powder	Metabolite
A7469	L-Alanine from non-animal source, meets EP, USP testing specifications, suitable for cell culture, $\geq 98.5\%$	Metabolite
G8415	L-Glutamic acid from non-animal source, meets EP testing specifications, suitable for cell culture, 98.5–100.5%	Metabolite
G7513	L-Glutamine solution 200 mM, solution, sterile-filtered, BioXtra, suitable for cell culture	Metabolite
C4135	Carbaryl phosphate disodium salt	Metabolite
A5835	$\gamma$ -Aminobutyric acid, BioXtra, $\geq 99\%$	Metabolite
O4126	Oxaloacetic acid $\geq 97\%$	Metabolite
71402	Sodium citrate tribasic dihydrate BioUltra, for molecular biology	Metabolite
L7022	Sodium L-lactate $\sim 98\%$	Metabolite
K2010	$\alpha$ -Ketoglutaric acid sodium salt BioUltra	Metabolite
E4143	(–)-Epigallocatechin gallate $\geq 95\%$	Inhibitor of Glutamate dehydrogenase
D2141	6-Diazo-5-oxo-L-norleucine crystalline	Inhibitor of various glutaminases
349631	Dimethyl 2-oxoglutarate 96%	—
C13408	O-(Carboxymethyl)hydroxylamine hemihydrochloride 98%	Inhibitor of Aminobutyrate aminotransferase
P6402	Perphenazine	Inhibitor of Glutamate dehydrogenase

### Gene Editing Tools For Studying Glutamine Metabolism

Cat. No.	Name
EHU130441	MISSION® esiRNA esiRNA human CAD (esiRNA1)
EHU066111	MISSION® esiRNA esiRNA human GART (esiRNA1)
EHU085901	MISSION® esiRNA esiRNA human GLS (esiRNA1)
EHU009581	MISSION® esiRNA esiRNA targeting human GMPS (esiRNA1)
EHU002881	MISSION® esiRNA esiRNA targeting human PPAT (esiRNA1)

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## Antibodies Against Proteins Involved in Glutamine Metabolism

Cat. No.	Name	Description
HPA057266	Anti-CAD antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA015613	Anti-CDH4 antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA002119	Anti-GART antibody produced in rabbit	Ab1, Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA036223	Anti-GLS antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA046630	Anti-GMPS antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA043922	Anti-PC antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA036092	Anti-PPAT antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
AV46079	Anti-PPAT antibody produced in rabbit	Affinity isolated antibody, lyophilized powder
SAB2500845	Anti-Pyruvate Carboxylase antibody produced in goat	Affinity isolated antibody, buffered aqueous solution

## Mevalonate Pathway in Cancer

The mevalonate pathway is the central pathway of cholesterol biosynthesis resulting in mevalonate which is used for the synthesis of isoprenoids, and precursors of cholesterol. The rate-limiting step is the reduction of HMG-CoA by the enzyme HMG-CoA reductase, which is the pharmacological target of cholesterol-lowering

statins. Isoprenoids generated from mevalonate, farnesyl pyrophosphate (FPP) and geranylgeranyl pyrophosphate (GGPP), are responsible for post-translational modification of proteins required for proliferation and differentiation, such as Ras and RhoGTPases.

## Kits for Analyzing the Mevalonate Pathway

Cat. No.	Name	Description
MAK043	Cholesterol Quantitation Kit	Sufficient for 100 colorimetric or fluorometric tests
CS1090	HMG-CoA Reductase Assay Kit	Sufficient for 30 assays
MAK516	MPO Assay Kit	Sufficient for 100 tests

## Metabolites, Inhibitors and Activators of the Mevalonate Pathway

Cat. No.	Name	Description
90469	(RS)-Mevalonic acid lithium salt ≥96.0% (GC)	Metabolite
50838	(R)-Mevalonic acid lithium salt ≥93.0% (qNMR)	Metabolite
44714	(S)-Mevalonic acid lithium salt ≥96.0% (GC)	Metabolite
07841	(R)-Mevalonic acid 5-phosphate lithium salt 95% (TLC)	Metabolite
77631	(R)-Mevalonic acid 5-pyrophosphate tetralithium salt ≥95% (TLC)	Metabolite
79849	(R)-Mevalonic acid 5-pyrophosphate tetralithium salt ≥95% (TLC)	Metabolite
94259	(±)-Mevalonic acid 5-pyrophosphate tetralithium salt ≥80% (qNMR)	Metabolite
18629	Isopentenyl phosphate dilithium salt ≥95.0% (TLC)	Metabolite
00297	Isopentenyl pyrophosphate trilithium salt ≥95.0% (TLC)	Metabolite
54747	γ,γ-Dimethylallyl phosphate ammonium salt ≥93.0% (TLC)	Metabolite
69579	γ,γ-Dimethylallyl pyrophosphate ammonium salt ≥93.0% (TLC)	Metabolite
76532	Geranyl pyrophosphate lithium salt ≥95.0% (TLC)	Metabolite
56901	Geranyl monophosphate lithium salt ≥95.0% (TLC)	Metabolite
18577	Neryl monophosphate lithium salt ≥95.0% (TLC)	Metabolite



Cat. No.	Name	Description
12436	Neryl pyrophosphate lithium salt ≥95.0% (TLC)	Metabolite
91356	trans,trans-Farnesyl monophosphate ammonium salt ≥95.0% (TLC)	Metabolite
44270	trans,trans-Farnesyl pyrophosphate ammonium salt ≥95.0% (HPLC)	Metabolite
F6892	Farnesyl pyrophosphate ammonium salt methanol:ammonia solution, ≥95% (TLC)	Metabolite
G3278	Geranylgeraniol ≥85% (GC)	Metabolite
G6025	Geranylgeranyl pyrophosphate ammonium salt solution, ≥95% (TLC), ~1 mg/mL in methanol: NH <sub>4</sub> OH (7:3)	Metabolite
277541	trans,trans-Farnesol 96%	Metabolite
A4978	Alendronate sodium trihydrate ≥97% (NMR), powder	Inhibitor of Farnesyl diphosphate synthase
P5248	Etidronate disodium hydrate ≥97% (NMR), solid	Inhibitor of Farnesyl diphosphate synthase
G5169	GGTI 298 trifluoroacetate salt hydrate ≥90% (HPLC), film	Inhibitor of Geranylgeranyltransferase I
G5294	GGTI-2133 ≥98% (HPLC), solid	Inhibitor of Geranylgeranyltransferase I
I5784	Ibandronate sodium salt ≥97% (NMR), solid	Inhibitor of Farnesyl diphosphate synthase
M2537	Mevastatin ≥95% (HPLC), powder	Inhibitor of HMG-CoA Reductase
M2147	Mevinolin from Aspergillus sp. ≥98% (HPLC)	Inhibitor of HMG-CoA Reductase
P2371	Pamidronate disodium salt hydrate ≥95% (NMR), solid	Inhibitor of Farnesyl diphosphate synthase
P4498	Pravastatin sodium salt hydrate ≥98% (HPLC), powder	Inhibitor of HMG-CoA Reductase
S6196	Simvastatin ≥97% (HPLC), solid	Inhibitor of HMG-CoA Reductase
S4194	SR 12813 ≥98%, solid	Inhibitor of HMG-CoA Reductase
SML0223	Zoledronic acid monohydrate ≥98% (HPLC)	Inhibitor of Farnesyl diphosphate synthase

### Proteins Involved in the Mevalonate Pathway

Cat. No.	Name	Description
H7039	3-Hydroxy-3-methylglutaryl-CoA reductase human solution	—
M6908	Myeloperoxidase from human leukocytes	Lyophilized powder, ≥50 units/mg protein

### Gene Editing Tools for Studying the Mevalonate Pathway

Cat. No.	Name
EHU116031	MISSION® esiRNA esiRNA human FDPS (esiRNA1)
EHU112171	MISSION® esiRNA esiRNA human PGGT1B (esiRNA1)
EHU112171	MISSION® esiRNA esiRNA human PGGT1B (esiRNA1)
EHU079561	MISSION®esiRNA esiRNA human HMGCR (esiRNA1)

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### Antibodies Against Proteins Involved in the Mevalonate Pathway

Cat. No.	Name	Description
HPA028200	Anti-FDPS antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA008338	Anti-HMGCR antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA021147	Anti-MPO antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
WH0005229M2	Anti-PGGT1B antibody produced in mouse	clone 5E4, purified immunoglobulin, buffered aqueous solution

## IDH PATHWAY IN CANCER

Isocitrate dehydrogenase (IDH) catalyzes the conversion of isocitrate to  $\alpha$ -ketoglutarate. In eukaryotes, there are three isozymes of IDH, the mitochondrial IDH2 and IDH3, and the cytoplasmic/peroxisomal IDH1. IDH1 and IDH2 mutations resulting in neomorphic enzymatic activity are

found in certain cancers such as glioblastoma, acute myeloid leukemia, and colon cancer. This neoactivity shows a change in the substrate specificity resulting in the conversion of  $\alpha$ -ketoglutarate to 2-hydroxyglutarate.

### Kits for Analyzing the IDH Pathway

Cat. No.	Name	Description
MAK054	Alpha-Ketoglutarate Assay Kit	Sufficient for 100 colorimetric or fluorometric assays
MAK062	IDH Activity Assay Kit	Sufficient for 100 colorimetric assays
MAK524	Isocitrate Assay Kit	Sufficient for 100 colorimetric assays
MAK038	NADP/NADPH Quantitation Kit	Sufficient for 100 colorimetric assays

### Metabolites Involved in the IDH Pathway

Cat. No.	Name
H8378	d- $\alpha$ -Hydroxyglutaric acid disodium salt $\geq 95\%$ (GC)
58790	(+)-Potassium Ds-threo-isocitrate monobasic $\geq 98.0\%$ (NT)
90790	l- $\alpha$ -Hydroxyglutaric acid disodium salt $\geq 98.0\%$ (GC)
94577	DL- $\alpha$ -Hydroxyglutaric acid disodium salt $\geq 98.0\%$ (GC)
K2010	$\alpha$ -Ketoglutaric acid sodium salt BioUltra

### Proteins Involved in the IDH Pathway

Cat. No.	Name	Description
I2411	Isocitrate Dehydrogenase 1 (NADP+) human	Recombinant, expressed in Sf9 cells, $\geq 90\%$ (SDS-PAGE)

### Gene Editing Tools for Studying the IDH Pathway

Cat. No.	Name
EHU057381	MISSION® esiRNA esiRNA human CIC (esiRNA1)
EHU110401	MISSION® esiRNA esiRNA human IDH1 (esiRNA1)
EHU053891	MISSION® esiRNA esiRNA human TET1 (esiRNA1)
EHU024791	MISSION® esiRNA esiRNA human TET2 (esiRNA1)
EHU097551	MISSION® esiRNA esiRNA human TET3 (esiRNA1)
EHU124501	MISSION® esiRNA esiRNA human TET3 (esiRNA2)
EHU004281	MISSION® esiRNA esiRNA targeting human IDH2 (esiRNA1)

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### Antibodies Against Proteins Involved in the IDH Pathway

Cat. No.	Name	Description
HPA044341	Anti-CIC antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
HPA035248	Anti-IDH1 antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
WH0003418M1	Anti-IDH2 antibody produced in rabbit	Clone 5F11, purified immunoglobulin, buffered aqueous solution
HPA019032	Anti-TET1 antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution
SAB3500711	Anti-TET2 antibody produced in goat	Affinity isolated antibody, buffered aqueous solution
HPA050845	Anti-TET3 antibody produced in rabbit	Prestige Antibodies® Powered by Atlas Antibodies, affinity isolated antibody, buffered aqueous glycerol solution

## Additional Kits for Cancer Metabolism Research

Cat. No.	Name
MAK007	Asparaginase Activity Assay Kit
MAK025	Iron Assay Kit
MAK040	Adipogenesis Kit
MAK051	Aconitase Activity Assay Kit
MAK333	Citrate Assay Kit
MAK082	Aldehyde Dehydrogenase Activity Colorimetric Assay Kit
MAK525	Acid Phosphatase Activity Fluorometric Assay Kit
MAK088	DPP4 Activity Assay Kit
MAK089	$\gamma$ -Glutamyltransferase (GGT) Activity Colorimetric Assay Kit
MAK094	Protein Carbonyl Content Assay Kit
MAK112	Arginase Activity Assay Kit
MAK114	Glyoxalase I Activity Assay Kit
MAK130	Chromium Assay Kit
MAK131	Formaldehyde Assay
MAK137	Phospholipase D Activity Assay Kit
MAK138	Autophagy Assay Kit
MAK142	Fluorometric Intracellular Ros Kit (Deep red)
MAK143	Fluorometric Intracellular Ros Kit (green)
MAK144	Fluorometric Intracellular Ros Kit (orange)
MAK145	Fluorometric Intracellular Ros Kit (red)
MAK147	Mitochondrion Membrane Potential Kit
MAK149	Mitochondrion Membrane Potential Kit (NIR fluorescence)
MAK150	Fluorometric Intracellular pH Assay Kit
MAK151	Fluorometric Thiol Assay Kit
MAK152	Colorimetric Sphingomyelinase Assay Kit
MAK154	Fluorometric Sphingomyelin Assay Kit

Cat. No.	Name
MAK155	Fluorometric Sphingomyelinase Assay Kit
MAK159	Mitochondrial Membrane Potential Kit (microplate readers)
MAK160	Mitochondrial Membrane Potential Kit (flow cytometry)
MAK161	Multidrug Resistance Assay Kit
MAK172	Proteasome 20S Activity Assay Kit
MAK173	Universal Fluorometric Kinase Assay Kit
MAK176	Granzyme B Activity Assay Kit
MAK183	PDH Activity Assay Kit
MAK187	Total Antioxidant Capacity Assay Kit
MAK189	A-KG Dehydrogenase Activity Assay Kit
MAK193	Citrate Synthase Activity Assay Kit
MAK213	Neutrophil Elastase Inhibitor Screening Kit
MAK223	Aldolase Activity Colorimetric Assay Kit
QIA120	Calpain Activity Assay Kit, Fluorogenic
MAK244	Plasmin Activity Assay Kit (Fluorometric)
MAK261	Glycine Assay Kit (Fluorometric)
MAK276	Sulfatase Activity Assay Kit (Colorimetric)
MAK277	GAPDH Activity Assay Kit
MAK293	Collagenase Activity Colorimetric Assay Kit
MAK309	Bile Acid Assay Kit
MAK313	Adipolysis Assay Kit
MAK314	Sialic Acid Assay Kit
MAK320	D-2-Hydroxyglutarate (D2HG) Assay Kit

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